

line of the essential points of plant anatomy and histology, may be regarded as preparatory to the more serious systematic study of the vegetable kingdom contained in section iii. As might be expected, Prof. Bokorny has adopted the Englerian scheme of classification, but reference is made to other systems, the Linnean system being considered, in a special chapter, at greater length perhaps than is desirable at the present day. The greater part of the section is devoted to the principal orders of phanerogams; and in his emphasis of well-chosen points of taxonomic importance and frequent references to plants of economic and biological interest, the author has produced a very clear and readable exposition of a branch of botany notoriously difficult to deal with in a manner which shall arouse and, more especially, sustain the interest of the student.

The question of general morphology is dealt with in the first section of part ii. Both the stage at which this important branch of botany is considered and the relatively small amount of space allotted to it—some twenty pages largely occupied by illustrations—would probably meet with criticism at the hands of most English botanists, and the same may be said with regard to the comparatively little attention paid to anatomy. But the principal features of part ii. are the sections dealing with physiology and ecology. In the latter section the author prefers the primary title of "Biologie der Pflanzen"; the various factors influencing plant life are first considered in some detail, and the actual studies of typical formations are concerned with the vegetation of the earth as a whole rather than with a detailed consideration of more restricted areas, a method more generally adopted in this country.

A feature of the book is the wealth of illustrations with which it is provided. Most of them are familiar friends, but they are drawn from very varied sources, and the inclusion of many of them is a further example of the freshness of conception which has been already commented upon as characterising these volumes.

OUR BOOK SHELF.

Dæmringen i Norge. By Prof. H. Mohn. Pp. 76. (Christiania: Jacob Dybwad, 1908.)

IN a country which stretches, as Dr. Mohn reminds us, to the 71st degree of north latitude, the times of sunrise and sunset, with the accompanying phenomena of twilight, have a wider significance than with us. There the calendar has to be consulted to find the day when the sun will first appear above the horizon, while the amount of light received when the sun is a definite distance below the horizon has a distinct economic value. Even the azimuth at which the sun will rise or set is not altogether a negligible quantity. Considerations of this kind have led Prof. Mohn to submit the question of twilight to a very close investigation, and to furnish tables which will enable an inhabitant of these northern regions to gauge very accurately how much direct or reflected sunlight he may expect. No doubt Prof. Mohn is well advised from a practical point of view, but in some respects his tables seem to aim at a greater

degree of accuracy than can be of service. In such questions as the effect of temperature on refraction, or the amount of reflected light, the variables arising from clouds and state of the sky generally would upset the nicety of the calculations. But so far as the convenience of the tables is concerned, and the thoroughness with which the theory is presented, there is nothing left to be desired, and it is not surprising if those who have not lived in a country where the economy of the winter light is a matter of importance fail to appreciate the necessity of this accuracy.

Prof. Mohn recognises four distinct steps in the approach of night or dawn. (1) The true time of geometrical sunrise or sunset when the sun's upper limb is on the astronomical horizon, or $Z_1 = 90^\circ + r - \pi + \rho$, where ρ is the refraction, r the sun's radius, and π the parallax. (2) The beginning and end of the gloaming (Skumringens Ende), when the sun's centre is 4° below the horizon. In clear weather in Norway, indoor work is possible under these conditions. Bright stars begin to appear in the sky. Sirius is visible when the sun is three degrees below the horizon. (3) It is more difficult to understand what is meant by the end of twilight. It is the time when daylight decreases most rapidly, and is described as the time when, in a clear sky, print can be read with difficulty if the light from the illuminated part of the sky is allowed to fall on the page, or when some kinds of outside work may be carried on. As a matter of computation, the time is decided by increasing the zenith distance of the sun, given in the first case by small angles depending on the atmospheric refraction, making the sun's zenith distance about 98° . (4) The last stage is that of complete night, or the time when the earth's atmosphere receives no light from the sun. The sun is then about 17° below the horizon. This scheme is a great practical advance on the method adopted in this country, where an arbitrary zenith distance of 108° is accepted as that at which night begins or ends. Tables are given for extending the calculations to other latitudes, and would make them available in the Shetland Isles and North Scotland.

Maryland Weather Service. Vol. ii. 1907. Pp. 515; illustrated. (Baltimore: The Johns Hopkins Press, 1907.)

THIS volume contains a report on the climate and weather of Baltimore and vicinity, prepared by Dr. O. L. Fassig under the direction of Prof. W. L. Moore, chief of the United States Weather Bureau; it is based on observations of the latter service since 1871, supplemented by all available records, both public and private, extending over a period of nearly a century. Meteorologists owe a debt of gratitude to the board of control of the Maryland Weather Service, and to Dr. Fassig especially, for one of the most complete and valuable meteorological discussions extant. Part i., which occupies more than half the volume, deals with climatic factors, each element being considered, so far as possible, with reference to its annual and diurnal periods and its variability; the statistical tables are supplemented by the usual range diagrams and also by isopleths, the principle of which was devised many years ago by M. Léon Lalanne. Although not frequently employed, the latter method exhibits in a concise and intelligent way the successive changes throughout the year. The value of this section of the work is much enhanced by careful discussion of the results obtained and of the interaction of the various elements, by references to the present state of our knowledge and to generally accepted theories.

Part ii. deals with actual weather conditions, with cold and warm waves, and types of weather, illustrated by beautifully executed synchronous charts. The discussions, which will be of the utmost interest to the students of practical meteorology, direct especial attention to the relation between wind-direction and temperature, the distribution of clouds, rainfall, &c. The author makes use of the long series of data at his disposal to test several points of popular interest. The temperature observations, extending over a period of eighty-seven years, do not exhibit any tendency to the cold period about May 10-13 which is observed in Europe; on the contrary, there is a distinct rise, probably due to high barometric pressure at this time over the southern Atlantic States. Nor do they show any regular recurrence of cold and warm periods; the only negative conclusion that the author considers may be safely drawn is that a cold winter is not likely to be followed by a warm spring or summer, and that a warm winter is not likely to be followed by a cold spring or summer. The observations clearly disprove the popular belief in the occurrence of severe storms at the equinoctial periods of March and September, while a comparison of weather conditions with the sun-spot curves neither proves nor disproves any intimate relation. We congratulate the author on the able way in which he has dealt with the whole subject, without having had recourse to mathematical formulæ.

A Monograph of the Silurian and Devonian Corals of New South Wales. Part ii. By R. Etheridge, jun. (Sydney, 1907.)

THIS part deals with the genus *Tryplasma*, of which several new species are described, from the Upper Silurian of the neighbourhood of Yass. A history of the genus is given, together with an account of its relations to other genera and its systematic position. Attention is directed to the intimate relation existing between the structure of Lindström's *Pholidophyllum* and that of *Tryplasma*, but in none of the Australian species of the latter have been found any of the exothecal scales which led Lindström to consider *Pholidophyllum tubulatum* (Schloth.) homologous in a certain sense with *Calceola*, *Goniophyllum*, and *Rhizophyllum*. The author advocates the removal of *Ph. tubulatum*, as a representative *Tryplasma*, from the vicinity of the *Anthozoa operculata* to a separate family, the *Tryplasmidae*, with relations to *Amplexus* and *Pycnostylus*. The general structure of the Australian *Tryplasmidae* is described in detail, but the examination of the development of the septal lamellæ and spines by means of serial sections was not attempted.

The Fauna of British India, including Ceylon and Burma. Published under the authority of the Secretary of State for India in Council. Edited by Lt.-Col. C. T. Bingham. Rhynchota. Vol. iv., part ii. Homoptera and Appendix (Part i.) By W. L. Distant. (London: Taylor and Francis, 1908.) Price 10s.

WE congratulate the editor and author on the appearance of another half-volume of this important work. The present instalment is devoted to the homopterous family Jassidæ, subfam. v. Jassinæ (including Acocephalinæ), comprising twelve divisions, and subfam. Typhlocybinae, with two divisions. The species included are numbered from 2509 to 2696. An appendix is commenced, including additions to the Rhynchota Heteroptera discussed in vol. i.; and the portion now published relates to the families Pentatomidæ, Coreidæ, and Berytidæ, and the additional

species are numbered from 2697 to 2768. The general character of "The Fauna of British India" is so well known, and has been so frequently commented on, that it is only necessary to say that the present half-volume is similar to those which have preceded it, and that the high character of the series is fully maintained.

How we Travel. A Geographical Reader. By J. F. Chamberlain. Pp. ix+227. (New York: The Macmillan Co., 1908.) Price 2s. 6d.

THE intention of the author of the series of four reading books, of which this is the last, is to develop an interest in the subject on the part of young pupils beginning the study of geography. The little book should be popular in the lower classes of secondary schools; it provides a simple, entertaining, and attractively illustrated account of means of travel and communication in various parts of the world. Previous volumes have dealt with man's activities connected with securing food, clothing, and shelter.

LETTERS TO THE EDITOR.

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Solar Vortices and Magnetic Fields.

SEVERAL weeks ago I discussed with Prof. Hale the matter of solar vortices and magnetic fields, with reference to his recent discoveries, briefly described in NATURE for August 20 (p. 368). It did not seem to me probable that the effects could be accounted for by unequal diffusivity of the positive and negative ions, or by centrifugal separation, nor does it seem necessary to assume, with Prof. Zeeman, that the magnetic effects are due to electrons participating in the vortical motion. Since that time I have recalled that, so far as definite evidence goes, all luminous vapours giving a line spectrum, and therefore capable of showing the Zeeman effect, are positively charged. A flame coloured with sodium or lithium vapour and placed between two condenser plates is attracted by the negative plate. This fact was used by Lenard to determine the velocity of the positive ions. As shown by Riecke and Stark (*Phys. Zeit.*, v., 537, 1904), if a sodium or lithium salt is placed on the kathode of a long spark the coloured vapour remains in that neighbourhood; if placed on the anode it is at once projected across the entire length of the gap. Hemsalech (*Comptes rendus*, cxlii., 2, 1906) proved spectroscopically that the metallic vapour in the spark is projected solely from the positive electrode. As shown by Stark (*Ann. der Phys.*, xiv., 529, 1904), that part of the luminous vapour in a mercury arc which gives a band spectrum is unaffected by an electric field, while that part which gives a line spectrum is positively charged. The canal and anode rays are likewise examples of positively charged carriers giving a line spectrum.

What becomes of the negative electricity in these cases is obscure; but the fact remains that somehow, either in the form of projected electrons or more rapidly moving negative ions, it gets away, and leaves behind the positively charged ions of the luminous vapour. If such is the case on the earth, we should expect it to be true of the luminous vapours of hydrogen, calcium, and other elements on the sun. Whether the vapours taking part in the sun-spot vortices are positively charged can easily be determined from Prof. Hale's observations on the Zeeman effect.

It would be interesting to know whether the solar vortices follow a definite cyclonic law, as is the case in the earth's atmosphere. If so, a definite resultant polarity should be produced by the aggregate of sun-spots, and accompanying magnetic fluctuations on the earth should be always in one direction. If the vortices are accidental the terrestrial effects should be irregular.